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ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 43.] JULY. [1890.

CL.—WEST AFRICAN ANNATTO.

(*Bixa Orellana*, L.)

The cultivation and preparation of the colouring substance known as Annatto were fully discussed in the *Kew Bulletin* for the months of July and September 1887. Since that time attention has been given to Annatto in West Africa, where the plant has apparently become widely naturalised. From the correspondence which follows, it will be gathered that the Annatto seed so far received from West Africa does not possess the qualities of Jamaica Annatto; but this may be due to the fact that the seeds had been gathered before they were fully ripe, or that they had been packed in a damp condition. There is apparently only a limited demand for Annatto in commerce, and it would be undesirable in any case to embark upon the industry on a large scale. Where, however, plants are found in a semi-wild state, as in some parts of West Africa, it might be possible to establish a small trade in preparing

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1890.

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"flag" and "roll" Annatto. These consist of the colouring matter washed from the seeds and made up into rolls or paste. There is a steady demand for good Annatto made up into this form, and as the freight and other charges would be less on paste than on seeds, there is a distinct inducement to adopt the preparation of paste. While the price of seeds varies from $1\frac{1}{4}d.$ to $3d.$ per pound, the price of paste ranges from $6d.$ to $1s.$ $8d.$ per pound, according to quality.

COLONIAL OFFICE to ROYAL GARDENS, KEW.

SIR, Downing Street, 22 January 1890.

I AM directed by Lord Knutsford to transmit to you, for your information, a copy of a despatch from the Officer Administering the Government of Lagos, reporting that he has forwarded to the Crown Agents, for transmission to your Department, a box containing Annatto dye.

Lord Knutsford would be glad if you could obtain the report asked for in the latter portion of this despatch.

I am, &c.
(Signed) EDWARD WINGFIELD.

The Director,
Royal Gardens, Kew.

[Enclosure.]

The OFFICER ADMINISTERING THE GOVERNMENT OF LAGOS to LORD KNUTSFORD.

Government House, Lagos,
MY LORD, 17 December 1889.

BY the steamship "Benin" I have forwarded to the Crown Agents, for transmission to the authorities at the Royal Gardens, Kew, a box containing Annatto dye, which has been grown at the Botanic Station.

2. The sample sent forward has been obtained from 14 trees two years of age; and as it would seem to me advisable that the Government should know if it is worth while to encourage the cultivation of this dye as an industry, I venture to ask your Lordship to be good enough to obtain a report from an expert on the quality and market value of the shipment which is covered by this letter.

I have, &c.
The Right Hon. (Signed) GEORGE C. DENTON.
Lord Knutsford, G.C.M.G., &c.

ROYAL GARDENS, KEW, to COLONIAL OFFICE.

SIR, Royal Gardens, Kew, 29th March 1890.

I AM desired by Mr. Thiselton Dyer to acknowledge the receipt of your letter of the 22nd January last, forwarding a copy of a despatch from the Officer Administering the Government of Lagos on the subject of an experimental consignment of Annatto seeds forwarded to this country for valuation and report.

2. The seeds were duly received at Kew early last month, and samples were forwarded to several firms of Annatto dealers and manufacturers inviting their opinion upon them for the information of the Government of Lagos.

3. Copies of the replies received are herewith enclosed. It appears that Lagos Annatto seeds are not so good as those exported from Jamaica; they are smaller, less bright in appearance, and not so rich in colour. This may be owing to the fact that the Lagos seeds were gathered before they were fully ripe. In any case the market value is very low, and it is doubtful whether West African seeds can be shipped to this country at a profit.

4. The subject of Annatto has already been very fully treated in the *Kew Bulletin* (July and September 1887). It is a matter for consideration, if the export of the seeds will not prove remunerative on the West Coast, whether it would be possible to prepare the flag or roll Annatto. There is a regular and steady demand for Annatto in this form, and the charges for freight are considerably reduced. The methods adopted in the preparation of flag or roll Annatto are fully given in the *Kew Bulletin* for July 1887.

I am, &c.

The Hon. R. H. Meade, C.B. (Signed) D. Morris.

P.S.—A sample of Jamaica Annatto seeds received from Messrs. John O'Kell & Co. is enclosed for the information of the Government of Lagos.

[Enclosure No. 1.]

Messrs. Fullwood and Bland to Royal Gardens, Kew.

Steam Annatto Works,
31, Bevenden Street, Hoxton, N.,
5th March 1890.

Dear Sir,

We are extremely sorry not to have been able to answer your letter in due course in consequence of our Mr. Bland's absence from home. We have received the parcel of Annatto seed from Lagos, and inasmuch as they are not a good sample, being small, and their colour not so bright as it should be, evidently having been gathered before they were quite ripe, we think that the present market value of such a quality would not be worth more than 2*d.* per lb. We, in fact, bought 70 barrels of about the same quality at 1¾*d.* per pound. The value is, of course, regulated by the quality and the quantity in the market. The highest price obtained in the London market last year was 3*d.* per pound, but when there was a scarcity in previous years they have realised as much as 6*d.* per pound. We think that before they send the seeds to London for sale they should send a sample first, and ascertain the market value, which we shall at all times be pleased to obtain for them. The Ceylon people made a great mistake in 1888 in sending *one* consignment of 150 barrels; the consequence of so large a quantity being thrown on the market was, that they were sold for less than cost of freight, dock charges, &c.

We are, &c.

(Signed) R. J. Fullwood and Bland.

[Enclosure No. 2.]

Messrs. John O'Kell & Co., to Royal Gardens, Kew.

46, Fenchurch Street, E.C.,
20th March 1890.

Dear Sir,

Your sample reached us this morning, which we have examined and compared with other seeds.

The commercial value is 2*d.* per pound. For your guidance we enclose a sample of Jamaica seed which sells at 3*d.* per pound, and if you will compare the two you will find the Jamaica much better.

The article is used for colouring purposes, chiefly cheese and butter.

Import last year, about 30 tons, which supplied all demands.

Yours, &c.
(Signed) Jno. O'Kell & Co.

[Enclosure No. 3.]

Messrs. Peter Lauer and Son to Royal Gardens, Kew.

2, Fowke's Buildings,
Great Tower Street, E.C.,
31st March 1890.

Sir,

We apologise for a tardy reply to your favour and sample of Annatto seeds under date 18th instant.

As regards the quality of the seeds you submit us from Lagos, we beg to observe that they possess the general characteristics of Ceylon seeds, which, when bright and clean, fetch, according to supply on the market, 2½*d.* and 3¼*d.* per pound (less London charges, say ¼*d.* to ⅜*d.* per pound). The sample you submit, however, is inferior in colour (the chief requisite), and the seeds appear to us to have been gathered or packed when damp, which renders them liable to mouldiness, the first stages of which appear in the dullness of colour.

Judging from the sample, we see no reason why the seeds in Lagos should not be cultivated to an equal point as in Ceylon. The article, however, is not one of great consumption, and it would be ill-advised to recommend cultivation on a large scale. The question of profit to the growers is, of course, determined by the actual cost of production at Lagos. The actual value of the quality you submit is not more than 1¾*d.* to 2*d.* per pound.

We are, &c.
(Signed) Peter Lauer and Son.

CLI.—PRESERVATION OF GRAIN FROM WEEVILS.

At various times application has been made to Kew for advice in the preservation of grain from the attacks of weevils. As the method suggested in the following correspondence does not seem to be generally known, a selection of papers bearing upon the subject is published. It is obviously a matter of great importance in countries like India, where the grain production is liable to fluctuation from climatic causes from year to year. It may be added that the use of bisulphide of carbon has been found a most effective method of preserving specimens of seeds, &c. in the Kew Museums free from the depredations of insects.

Mr. Julius P. Jameson to Royal Gardens, Kew,

10 Austin Friars, E.C.,
21 November 1879.

Dear Sir,

At the suggestion of J. Simpson, Esq., manager for Donald Currie & Co., I take the liberty of addressing you on a subject of great interest in South Africa,—the preservation of grain, principally maize. In King William's Town last year it was worth 40*s.* per bag, and I shipped some thousands of bags by mail steamer, and sold them at that. It is now worth 10*s.* ber bag. It will probably next year be worth 5*s.* per bag. It may be 30*s.* again in a few years. I wish to learn how to preserve it from weevil. We do not fear damp or spoiling, but this insect is almost certain to swarm in it if kept a year in an ordinary way. Could you recommend me a work to read on kiln-drying grain, though that would be expensive in our country without coals and very little wood. Would I learn much about it if I went to Algiers or Tunis or even Egypt? The climate in North Africa must be much the same as South: soil and product also much alike. They surely have means of preserving years of plenty till years of famine as Joseph did as related in the Bible. I shall probably return to South Africa next year, and as I have to buy grain largely from some natives and to sell it again to natives and Europeans, I am anxious to try some method of keeping it free from weevil. I doubt if kiln-drying would do it.

If you could put me in the way of learning aught on this subject I shall be greatly obliged. My partner is a member of Cape Parliament.

I remain, &c.

(Signed) Julius P. Jameson.

Mr. Church, Professor of Chemistry to the Royal Academy, very kindly supplied the following memorandum, a copy of which was furnished to Mr. Jameson.

Memorandum by Prof. A. H. Church, F.R.S., on the Preservation and Drying of Grain.

The only effective instrument for drying grain is that invented by Mr. W. A. Gibbs, of Gillwell Park, Chingford, Essex. It is called "Gibbs' Patent Tea Dryer," and is suitable for drying corn, coffee, manures, hops, brewers' grains, and fruit.

The only cheap and perfect application for the prevention of the attacks of weevil upon corn and grains consists in the employment of bisulphide of carbon. The quantity required, provided the grain is kept in closed vessels, is very minute—not more than 1½ lb. to each ton of grain—so that 8*d.* is the cost of preserving a ton of wheat. The bisulphide leaves no disagreeable taste or smell behind, and the quality of the grain remains unimpaired. When bags are used instead of the iron cylinders specially prepared for use in the bisulphide process, the protective influence of this chemical soon ceases, and a fresh application of the bisulphide must be made. In either case the liquid is applied as follows. A ball of tow is tied to a stick of such a length that it can just be plunged into the middle of the vessel containing the grain. The tow receives the charge of bisulphide like a sponge and is then *at once* plunged into the sack or cylinder and left there, the mouth being

tightly closed. When necessary the stick may be withdrawn and the charge (of 1 oz. bisulphide to 100 lbs. of corn) may be renewed.

(Signed) A. H. Church.

Shelsley, Kew,
25 November 1879.

A somewhat similar method was devised in Burma by Mr. Cabaniss; naphthalene being employed instead of bisulphide of carbon.

Royal Gardens, Kew, to India Office.

Sir, Royal Gardens, Kew, 9 May 1887.

I have the honour to acknowledge the receipt of your letter of May 5, forwarding copies of various papers received from the Revenue Department of the Chief Commissioner of Burma.

These papers contain much information of use and interest to us.

With reference to the note by Mr. F. W. Cabaniss, Assistant Director of Agriculture, Burma, on the prevention and destruction of black weevil in grain-bins and godowns, it may perhaps be worth mentioning that a similar difficulty was brought under our notice some years ago in South Africa.

Mr. Church, the Professor of Chemistry at the Royal Academy, was good enough to supply me with a memorandum on the subject, of which I enclose a copy.

I am, &c.

(Signed) W. T. Thiselton Dyer.

A. N. Wollaston, Esq., C.I.E.

Note by Mr. F. W. Cabaniss, Assistant Director of Agriculture, Burma, on the Prevention and Destruction of Black Weevil in Grain-bins and Godowns, dated the 5th November 1886.

The black weevil is an insect well known to grain dealers, I suppose, the world over, and especially well known in tropical climates. In India it eats the grain of wheat and maize from the time it is reaped until it is in the hold of the ship, or made into bread and the bread eaten. It will even eat bread after it has been baked. It is most probably found in every rice, til, wheat, maize, and sorghum godown in Burma.

Like many other insects the black weevil seems to flourish particularly well in Burma. This is owing to the even temperature of the climate, as it dislikes the sudden changes to either heat or cold. It is impossible to estimate the amount of damage caused by this insect in Burma; but it is enormous. A large per-centage of the shrinkage in stored grain can properly be attributed to destruction by this insect. It is not detected unless in very large numbers, but when the grain is cleaned by being passed through a fan, mill, or winnower, grain which has already been thoroughly cleaned will show a large amount of dust and a material falling off in the weight of the bulk or bin of grain. The natives try to combat the ravages of this insect by spreading the grain in the sun and then placing gunny cloth on the top of the grain, when

the insect, disturbed by the heat of the sun, crawls out of the grain to the top of the cloth and is then shaken off, and the grain returned to the bin. This method of temporarily getting rid of the insect cannot be followed when there is a large amount of grain in store, on account of the expense of handling the grain.

I have been trying for several years a number of experiments, with the object of finding a cheap and simple method of preventing the ravages of this weevil. I think that I have found it in the use of naphthalene powder. My method of using the powder is here given for the benefit of the grain dealers of Burma. It is best to place the naphthalene powder at the bottom of the bin or bulk of grain. To accomplish this take a bamboo, about 1½ inches in diameter and long enough to reach from the top to the bottom of the bulk of grain. Punch the joints out of the bamboo, so as to be able to pass a stick through from one end of the bamboo to the other. Have the stick made to fit the cavity in the bamboo. Pass the bamboo, with the stick in it, down through the bulk of grain from the top to the bottom. Withdraw the stick, and drop into the top of the bamboo about half a teaspoon of naphthalene powder. The bamboo can then be drawn out, as the naphthalene is safe at the bottom of the bulk of grain. If the bulks are large this should be done once to every 10 feet square of the bulk. Repeat the application every 15 or 20 days as the powder evaporates.

The weevil that can leave the grain will do so, and those that cannot leave are killed by the odour of the naphthalene. I do not believe that naphthalene thus used can cause any injury whatever to grain. For seed purposes the germinating powers appear not to be affected in the least. For marketable grain the colour is not affected, and the odour will leave in a short time if fresh naphthalene is not applied to it. The quantity of powder used is infinitely small in proportion to the quantity of grain, and the powder is entirely destroyed by evaporation, so that for food purposes the effect is *nil*.

Naphthalene powder can be procured at the Medical Halls in Rangoon at Rs. 2 8 0 per ounce, and a few ounces of it will be sufficient for one season for any grain dealer in Burma.

F. W. Cabaniss.

India Office to Royal Gardens, Kew.

India Office, Whitehall, S.W.,
24th May 1887.

Sir,

I am directed by the Secretary of State for India to acknowledge, with thanks, the receipt of your letter of the 9th instant, forwarding a Memorandum by Professor Church on the destruction of weevil in grain, and, in reply, to inform you that a copy of the paper in question will be transmitted to the Government of India for their information.

I am, &c.

(Signed) A. N. Woollaston,
Assistant Secretary,
Revenue, Statistics, and Commerce
Department.

The Director,
Royal Gardens, Kew.

The following extract gives some exact particulars as to the nature of the insects which infest wheat in India and as to the magnitude of the loss which their ravages involve.

Extract from Report issued by the Agricultural Department on Wheat Weevils, Agr. $\frac{8}{1889}$.

An account of the wheat and rice weevil, *Calandra oryzæ*, in India, written by Mr. Cotes, the first assistant to the Superintendent of the Indian Museum at Calcutta, has been received from the India Office by the Agricultural Department.

This account forms the first number of "Notes on Economic Entomology," issued by the Indian Museum Authorities, and is so interesting that it is considered desirable to give extracts from it, especially as the wheat weevil causes very great injury to Indian wheat, both as regards quantity and quality, and is in many respects similar to the grain weevil, *Calandra granaria*, which does so much harm to wheat and other corn in British granaries.

Mr. Cotes states, that in the latter part of June, grains may be seen in the heaps of wheat that had been harvested in the early part of the hot weather, each grain having a hole drilled in it and a considerable part of the contents eaten away. This is the work of the wheat weevil, *Calandra* (*Sitophilus*) *oryzæ*, Linn. At the same time the perfect weevils are found creeping about the upper layers of the grain, and coming to the surface in large numbers when the heaps are disturbed.

The soft varieties are most liable to this attack. Delhi, Buxa, and Hanskhali wheats being the worst, while hard red wheat is but slightly damaged.

According to estimates furnished by Messrs. Ralli Brothers, the well-known Indian wheat shippers, the amount of loss occasioned by this weevil is put at an average of 2½ per cent., the maximum being 5 per cent. Taking the whole of wheat exported at 6,000,000*l*., the annual loss due to these insects, in exported wheat alone, equals 150,000*l*.

Mr. Cotes adds that in reality, however, this sum represents but a fraction of the real loss, as it does not take into account the damage done to wheat consumed in the country, nor any of the loss occasioned to rice, which is also attacked by the same weevil, besides the loss indirectly caused by the difficulty in storing the grain.

There are two species of weevils, *Curculionidæ*, belonging to the division *Rhyncophora*, which attack stored wheat and other grain. One is *Calandra* (*Sitophilus*) *granaria*, and the other *Calandra* (*Sitophilus*) *oryzæ*. The former is found principally in Europe, America, and Canada. The latter, which requires a high temperature, is chiefly confined to India and other countries whose climate is hot.

These species closely resemble each other, and can only be distinguished by a practised eye.

The Government of India in 1887 appears to have directed experiments to be made as to the efficacy of the method recommended by Professor Church. The following report appears to show that it is well adapted to meet the difficulty in India.

EXTRACT from Annual Reports of the Experimental Farms at BHADGAON in KHA'NDESH, and HYDERABAD in SIND, for year ending 31st March 1889.

In pursuance of Government Resolution No. 6093, dated 9th September 1887, Revenue Department, experiments were made to test the efficacy of CS_2 as a preservative of grain from the attack of weevils, and upon which a separate report was submitted in August last. The observations were continued this year.

A summary of the results of the experiment is given below :—

(*a.*) That soft varieties of grain, such as soft wheats and jowári, are sooner attacked with weevils than hard varieties, as bansi wheat, bájri, &c.

(*b.*) That CS_2 is a perfect preservative against the attack of weevils upon grain.

(*c.*) The action of CS_2 lasts in cases not hermetically closed six weeks, after which period a fresh charge of the re-agent is required.

(*d.*) That even in samples which have been attacked with weevils the effect of CS_2 is immediately felt, the weevils disappearing *en masse.*

(*e.*) That CS_2 does no harm to grain as regards its colour, smell, cooking properties, &c.

(*f.*) That the poisonous property of CS_2 need in no way interfere with its introduction into Indian villages, as, unlike arsenic, its strong and repugnant smell will act as a sufficient safeguard.

(*g.*) With the dismantling of the old granary, which was used as a storehouse of grain for the last 19 years, weevils have almost disappeared from the farm. After a long and diligent search I succeeded in observing only a few under the heaps of jowári ears in the threshing yard so late as the 20th of last month. This proves beyond doubt that wheat is most damaged by weevils in city godowns, where a large quantity of it is stored every year before being shipped to Europe.

(*h.*) It is, therefore, fair to conclude that painting the interior of the godowns with poisonous paints, and charging the grain with CS_2 (in the proportions of $1\frac{1}{2}$ lbs. of the re-agent to a ton of grain) will reduce the damage caused by weevils to wheat and other grains to a considerable extent.

CLII.—COLOMBIAN INDIA-RUBBER.

(*Sapium biglandulosum*, Muell. Arg.)

The United States of Colombia have long been recognised as a subsidiary source of india-rubber. Colombian rubber has been generally known in commerce from the place of export as "Carthagena." It has been supposed to be the produce of a species of *Castilloa*, and this may to some extent have been actually the case. The larger proportion of the export found its way to the United States.

In the following correspondence Mr. Robert Thomson, formerly in charge of the Cinchona plantations, Jamaica, and now settled at Bogota,

gives an interesting account of a tree which yields the india-rubber, known in commerce as "Colombia Virgen." This has the peculiarity, unlike all other known sources of this substance, of growing at high elevations, and therefore in a comparatively cool climate.

From the indications furnished by Mr. Robert B. White, and subsequently by Mr. Thomson, there can be little doubt that the tree is one of the multiform varieties of *Sapium biglandulosum*, a member of the family *Euphorbiaceæ*, to which the trees yielding the Pará and Ceará rubbers also belong. This widely spread and extremely variable species extends from Mexico and Panama to Colombia, Venezuela, Guiana, and Brazil. The variations which it presents in habit are probably as extreme as are to be met with in the vegetable kingdom. And it is probable that its rubber-producing qualities may be equally variable. In the West Indies it exists in forms which are probably conspecific. But though recognised as abounding in a milky juice it has never been regarded in that region as a source of caoutchouc, at any rate in appreciable qualities.

In British Guiana the species occurs in two forms, which have been carefully studied by Mr. G. S. Jenman, F.L.S., Government Botanist. The form which occurs on the Pomeroon River is known in Carib as *Touckpong*, in Arawack as *Cumakaballi*. The examination of the caoutchouc-like product of this tree, conducted at the works of the India-rubber, Gutta Percha, and Telegraph Works Co., Limited, at Silvertown, through the courtesy of Mr. S. W. Silver, F.L.S., were, on the whole, unsatisfactory as regards its utilisation for any commercial purpose. This was due to the presence of a resinous substance, which seriously deteriorates its characteristic properties. There can, however, be no sort of doubt as to the value of the Colombian rubber yielded from the same species, and this would make it desirable to give the Guiana trees a fresh trial. M. Sagot, the well known Guianan botanist, to whom Mr. Jenman's specimens were submitted, knew nothing of the caoutchouc-producing properties of the species beyond the fact that the aborigines of the West Indies used the sap as a bird-lime for catching birds.

India Office to Royal Gardens, Kew.

India Office, Whitehall, S.W.,
January 26th, 1889.

Sir,

I am directed by the Secretary of State for India in Council to forward, for your information, a copy of a correspondence on the subject of a proposal made by Mr. Robert Thomson, of Bogota, in connexion with the introduction to India of the species of *Hevea* [Sapium] which produces the rubber known as the "Colombia Virgen."

You will observe that the Government of India are desirous that Mr. Thomson's proposal should be submitted to you in the first instance, and I am to ask you to be so good as to favour me with any remarks you may wish to make on the subject.

I have, &c.
(Signed) J. A. Godley.

The Director,
Royal Gardens, Kew.

Mr. Robert Thomson to India Office.

Bogota, Republic of Colombia,
My Lord, July 23rd, 1888.

I have the honour to submit the following remarks relative to a species of india-rubber tree indigenous to this country, it having occurred to me that the introduction of the cultivation of this species would be attended with important results to India.

This rubber is known in commerce as "Colombia Virgen." It has been exported chiefly to the United States, and next to the Pará rubber it has realised the best prices in the market. But the Pará rubber undergoes elaborate preparation for the market, whereas the Colombia Virgen is simply dried in the sun and by fire; hence it is capable of much improvement. As far as I am aware, this plant has not been botanically described, but it is Euphorbiaceous, and is closely allied to the genus *Hevea*, the Pará rubber plant.

I have established in this country during the last five years a plantation of this rubber consisting of about 70,000 trees, this being, I believe, as yet the only plantation made of this sort. Under cultivation this tree thrives admirably, growing with great rapidity, and averaging about five feet a year.

Crops are obtainable in from six to eight years, but a tree five years old yields as much as 1 lb. of rubber. It is a large forest tree, the trunks attaining six and seven feet in circumference. Four arrotas (100 lbs.) of rubber have been extracted from a single tree, but the average yield is far less.

All the well-known South American rubber plants, viz., the Pará, Castilloas, and Ceará have been introduced into India. But the species under consideration is not, I believe, known in India.

The important consideration as regards this species, apart from its intrinsic value, is that it grows at great elevations on the Colombian Andes, viz., at from 6,000 to 8,000 feet above the sea; hence in a salubrious mountain climate a condition of cultivation of prime importance in the estimation of the planters of India and Ceylon, for the planters appreciate the advantage of growing a product in the genial climate of the mountains as compared with cultivating in the malarious climate of the plains. The conditions of climate requisite for the other species of rubber are described by Mr. Gustav Mann, an authority on Indian products, thus "the heat is about 98° in the shade in Upper Assam. "Under these conditions, which are of excessive moisture, even partial "inundations during a portion of the year, caoutchouc trees of all "countries thrive best." The Ceará rubber, however, grows in hot *arid* regions.

Prior to the wholesale destruction of this tree (but few now remain) by the rubber collectors, I explored, some five years ago, the forests wherein it abounded in order to examine the soil, climatic and other conditions affecting its growth. It may be mentioned that its area of distribution has been peculiarly limited to a small section of the Cordilleras some 1,500 miles from the sea. The total quantity of rubber exported during the few years the article existed could not have amounted to many hundred tons.

It is very difficult to propagate the tree from cuttings; hence I have had to resort, during my supervision of the plantation, to propagation from seed, which, moreover, were always procured with much difficulty.

Efforts are being made in India to cultivate the *Ficus elastica* on a large scale, which, according to Mr. Clement R. Markham, "may be "tapped in 25 years"—a long time to wait for a crop, a fact which must dissuade planters. The Colombian species, besides being adapted to a salubrious mountain climate, yields early returns and a more valuable product.

I would undertake to convey to India a supply of plants and seeds, the germination of the latter to be ensured on the spot, and to deliver the same in Sikkim, the Nilgiris, or Ceylon. The supply of plants thus to number from 10,000 to 50,000, which I would deliver for the sum of 1,000*l.*

* * * * * *

I have, &c.
(Signed) Robert Thomson.

The Right Hon. Viscount Cross,
Secretary of State for India,
London.

India Office to the Governor-General of India.

India Office, London,
My Lord, 20th September 1888.

I forward herewith a copy of a letter, of the 23rd of July last, from Mr. Robert Thomson, of Bogota, in the Republic of Colombia, drawing attention to a new species of *Hevea* (N. O. *Euphorbiaceæ*) as a valuable source of rubber, and recommending its experimental cultivation in India.

2. Mr. Thomson offers to personally deliver "from 10,000 to 50,000" established seedlings in India for the sum of 1,000*l.* After you have consulted the officers of the Forest and Botanical Departments I shall be glad to have the opinion of your Excellency's Government on this proposal.

I have, &c.
His Excellency the Right Hon. (Signed) Cross.
the Governor-General of India,
in Council.

Government of India to India Office.

Revenue and Agricultural Department, Calcutta,
My Lord, 4th December 1888.

We have the honour to acknowledge the receipt of your Lordship's Despatch No. 80 (Revenue), dated the 20th September last, forwarding a copy of a letter from Mr. Robert Thomson, of Bogota, in the Republic of Colombia, South America, in which he draws attention to a new species of *Hevea* (N. O. *Euphorbiaceæ*) as a valuable source of rubber, and recommends its experimental cultivation in India. Mr. Thomson has offered to personally deliver from 10,000 to 50,000 established seedlings in India for the sum of 1,000*l.*, and your Lordship desires, after we have consulted the officers of the Forest and Botanical Departments, to be furnished with our opinion on the proposal in question.

2. In reply, we beg to say that in the absence of any safe information as to whether the plant would yield rubber in sufficient quantities to

justify the expenditure proposed, or, indeed, as to whether the plant would grow at all in India, we do not think it expedient to entertain Mr. Thomson's proposal. We would therefore suggest, for your Lordship's consideration, that the Director of the Royal Gardens, Kew, should be asked to place himself in communication with Mr. Thomson, and if Mr. Thiselton Dyer, after due consideration of the matter, is of opinion that the proposed experimental cultivation of the plant in India is really worthy of a trial, arrangements might be made, under your Lordship's orders, for the purchase and transmission to this country of a few plants only, or of a small supply of the seed. This procedure would be in keeping with the course approved by past experience, viz., that all new economic plants should reach India through the Director of the Royal Gardens, Kew.

We have, &c.
(Signed) Dufferin and Ava.
C. A. Elliott.
P. P. Hutchins.
D. M. Barbour.

The Right Hon. Viscount Cross, G.C.B.,
Her Majesty's Secretary of State for India.

Royal Gardens, Kew, to India Office.

Sir, Royal Gardens, Kew, July 8, 1889.

I have had before me for some time your letter [R. S. & C. 1784] of January 26, 1889, forwarding a copy of correspondence with Mr. Robert Thomson, of Bogota, relative to the proposed introduction into India of a species of *Hevea* which produces the rubber known as Colombia Virgen.

2. Having regard to the very large expenditure which the Government of India has already incurred in the introduction of South American rubber trees into India, I confess I am not disposed to support any further outlay upon it. The plants yielding Pará, Ceará, and Nicaragua (or Guatemala) rubber have all been successfully introduced into India. It now only remains by practical experience to find positions in which they may be established on a sufficient scale to yield in the not distant future a remunerative revenue to the Government or to the private planter. My own conviction is that the cultivation of these trees is emphatically a matter to be entrusted to the Forest Department. And I have deliberately waited before dealing with Mr. Thomson's application till the Secretary of State in Council had had the opportunity of considering the interesting results which I communicated to you in June 4th last, and the receipt of which you acknowledged on the 29th following [R. S. & C. 922], of the examination of samples of rubber from Pará-rubber trees (*Hevea brasiliensis*), near Mergui in Tenasserim.

3. It appeared from Mr. Silver's report that rubber collected from these trees on which it had congealed without any preparation at all was valued at 2*s.* 3*d.* a pound, and was nearly equal to the best South American rubber. This disposes of Mr. Thomson's statement that "Pará rubber undergoes elaborate preparation for the market."

4. There are considerations, with which I need not trouble you, why I should hesitate to recommend Mr. Thomson's employment. But I may point out that the only real recommendation of the species of rubber which he wishes to introduce into India is that its cultivation is

suitable for high levels. It appears to me more than doubtful whether land adapted to the tree would not in India and Ceylon be generally devoted to other cultures likely to yield more profitable results than india-rubber.

5. As far as I am aware nothing is known to botanical science of the tree recommended by Mr. Thomson. I propose therefore to write to him to ask him to send botanical specimens for its identification, and also a few hundred seeds, for which I shall be prepared to pay a small gratuity from the annual sum placed at our disposal by the India Office for inquiries relative to economico-botanical subjects.

6. I entirely concur in the wise hesitation shown by the Government of India in entertaining Mr. Thomson's proposal without the precise and definite information on the subject which we do not at present possess.

I am, &c.
(Signed) W. T. Thiselton Dyer.

J. A. Godley, Esq., C.B.,
India Office.

Royal Gardens, Kew, to Mr. R. Thomson.

Sir, Royal Gardens, Kew, July 16, 1889.

I am desired by Mr. Thiselton Dyer to inform you that your correspondence with the India Office on the subject of "Colombia Virgen" rubber trees has been referred to him with the decision of the Government of India on the subject.

2. As no doubt you are aware it has been resolved, in the absence of accurate information respecting the nature and value of these rubber trees that this establishment place itself in communication with you and obtain botanical specimens for the exact determination of the species, and also some plants or seed for experimental trial at Kew.

3. If you are disposed to accede to the wishes of the Government of India Mr. Thiselton Dyer is prepared to authorise you to incur expenses in the first instance to the extent of five pounds in procuring botanical specimens, and in sending some seeds or plants of this particular kind of rubber to this country.

I have, &c.
(Signed) D. Morris.

Mr. R. Thomson,
Bogota, Republic of Colombia.

Mr. R. B. White to Royal Gardens, Kew.

My dear Sir, Agrado, January 12th, 1890.

I have been trying to get the flowers and seeds of the cold region india-rubber tree, but it is pretty clear that hereabouts it is not the flowering season. I think there is little doubt of its being a species of *Siphonia*. It is not a *Ficus*.

At elevations of 3,000 to 4,000 feet a *Ficus* has produced much india-rubber, but this—the best white Virgen—comes from 5,000 to 7,000 feet elevations, and is another thing entirely. Its mean temperature is about 50° to 60° Fah.

I know the tree giving the white rubber of Chocó in years gone by, growing in the hot climate. It is a *Siphonia* and its habit is very similar to the cold country tree.

Ficus are usually irregularly branched and are not so straight. The milk of this tree coagulates directly it is taken from the tree. Most india-rubbers do not, and many have to be coagulated by Alkalis. Some of the milks can be kept for weeks, and articles may be painted with them, when the rubber will dry and make a good hard coating. I have mended my air pillows, &c. in this way.

But this cold region rubber will not keep, and it evidently contains much more caoutchouc (caucho is better) than the other sorts.

I expect that it will turn out that the tree flowers in May, and has seed in June or July, and then I will try again to get you specimens. The trees have become so scarce in the most accessible parts that it is both troublesome and expensive to get samples, but I will do my best.

I am, &c.

(Signed) Robert B. White.

W. T. Thiselton Dyer, Esq.,
Director, Royal Gardens, Kew.

P.S.—I enclose a leaf with its scaly stipules and peculiar glands ? at base. The leaves are alternate whorled.

[There could be little doubt that this leaf belonged to a form of *Sapium biglandulosum*.]

Mr. R. Thomson to Royal Gardens, Kew.

162, Belsize Road, London, N.W.,
14th May 1890.

Sir,

With reference to the conversation I had with Mr. Morris, the Assistant Director, on the 26th ultimo, on the subject of my correspondence with the India Office relative to the introduction into India of the cultivation of Colombia Virgen rubber, I respectfully beg leave to submit the following remarks:—

As I informed Mr. Morris it is to be regretted that your letter on this subject, addressed to me in Colombia, never came to hand. I now have to thank you for a copy of the lost letter dated the 16th July 1889, which I received some days ago.

Having informed Mr. Morris that I possess drawings of the inflorescence, &c. of this species of rubber, at his suggestion I submitted the same to Professor Oliver (keeper of the Herbarium) for identification. Professor Oliver in a note to me says, "I can hardly doubt that your rubber "plant is *Sapium biglandulosum*, a variable tropical American species, "and known rubber producer." Subsequently the Professor showed me the Kew Herbarium specimens of *Sapium biglandulosum* obtained from British Guiana, &c.

My impression, judging from these specimens, is that the Colombia Virgen is quite a distinct species. In the latter there is very slight variation in the size of the leaves, whereas in the Guiana specimens the variation is extremely marked. The leaves, too, in the Colombia Virgen are in point of size several times larger than the others. Also the glands at the base of the leaves are several times larger than those in the Guiana specimens.

In addition to the rubber-yielding species in question, there are several very distinct species of this genus widely distributed in the interior of Colombia, all of which contain large quantities of milky juice, which, however, does not coagulate on exposure to the air, as is the case with the rubber-yielding species. Thus, on account of the milky juice not

coagulating on exposure to the air, these kinds have never been utilised for commercial purposes.

At the same range of altitude at which the Colombia Virgen grows, two very distinct species of the same genus abound. The latter are easily distinguished by the rubber collectors (coucheros) by the size of the fallen foliage, as well as by the size, colour, and texture of the trunk. The foliage, fruits, and seeds are small as compared with the rubber producer. These species are found at altitudes ranging from 5,500 to about 8,000 feet above the level of the sea.

Descending the slopes of the forest-clad mountains from the lower elevations at which the Colombia Virgen grows (5,500 feet), another distinct species occurs at an altitude of about 3,500 feet. This species presents a striking resemblance to the Colombia Virgen, and it can only be distinguished after considerable experience. This kind, too, yields only a milky juice. Lower down the mountains still another species extends, viz., from about 3,500 to 2,000 feet above the sea. This latter is found on land denuded of forest, and in regard to its general aspect, foliage, &c. it approximates very closely to its rubber congener, so much so, indeed, that at first sight it is easily mistaken for the other. All the species are characterised by the two glands at the base of the leaves.

It may be here mentioned that some three years ago a distinct variety of the Virgen rubber was discovered at a considerably lower altitude than that at which the species in question grows, thus at about 4,000 feet above the sea. This variety existed only on a very circumscribed area, and all the trees were felled and the product extracted with great celerity. The prices obtained for this corresponded exactly with those obtained for the typical article.

During the past fortnight I have been making inquiries at museums, &c. in London with the view of ascertaining whether a sample of the rubber is on exhibit here. Only at Mincing Lane I have detected samples of the Colombia Virgen. There it is designated "Colombia scrap," and the expert in charge of this department informed me that the current rate of value of this rubber is 3*s*. per lb. That gentleman further informed me that there can be no doubt that if large consignments of this were obtained from Colombia instead of insignificant quantities, the price of the article would be enhanced, for manufacturers adapt, to some extent, their machinery to the class of article under treatment.

I herewith forward some 3,000 seeds of the Virgen species. These seeds were collected fully a year ago, but I have succeeded in the germination of seeds four years old.

Having resided during seven years on the spot, between 3° and 4° N. latitude, where these rubber trees grow, I am well acquainted with the conditions of soil, humidity, and temperature requisite for the successful cultivation of the plant. For further information on this point I beg to refer you to my letter dated the 23rd July 1888 to the Secretary of State for India.

In conclusion, I may mention that in India the best localities for this cultivation would be obtainable at points between 20° and 26° latitude, and at elevations of from 2,500 to 5,000 feet above the sea. Of course, in more southern latitudes higher elevations would have to be selected.

I have, &c.

(Signed) Robert Thomson.

W. T. Thiselton Dyer, Esq., C.M.G., F.R.S.,
Director, Royal Gardens, Kew.

Messrs. Hecht, Levis, and Kahn, to Royal Gardens, Kew.

21, Mincing Lane, London, E.C.,
17th May 1890.

Dear Sir,

In answer to your yesterday's letter we beg to say that Colombian scrap rubber has been known in the market for the last few years, and is of a very superior quality indeed.

It would be difficult to give you the exact average market value, but it has varied during the last few years between 2*s.* 3*d.* and 3*s.* per lb.

At the present moment the value is about 2*s.* 11*d.* to 3*s.*

In accordance with your desire, we are sending you to-day a small sample, which will show you the fine texture of this rubber.

We are, &c.
(Signed) Hecht, Levis, & Kahn.

John R. Jackson, Esq.,
Royal Gardens, Kew.

India Office to Royal Gardens, Kew.

India Office, Whitehall, S.W.,
14th June 1890.

Sir,

I am directed by the Secretary of State for India to inform you that Mr. Robert Thomson, of 162, Belsize Road, N.W., has forwarded to this Office a copy of your letter to him of the 24th ultimo on the subject of the Colombia Virgen rubber.

As Mr. Thomson is desirous of knowing whether the Government of India will be likely to undertake the experimental cultivation of this tree, I am to ask you to be so good as to furnish this Office with the definite information concerning Colombia Virgen, which is alluded to in paragraph 4 of your letter above quoted, and at the same time to state whether the opinion concerning the introduction of this variety of rubber into India expressed in your letter to this Office of the 8th July last, has been in any way modified by the information now in your possession.

I am, &c.
(Signed) J. A. Godley.

The Director,
Royal Gardens, Kew.

Royal Gardens, Kew, to India Office.

Royal Gardens, Kew, June 18, 1890.

Sir,

I have the honour to acknowledge the receipt of your letter of June 14th [R. & S. 772].

2. We are advised by competent brokers that "Colombian scrap "rubber has been known in the market for the last few years, and is of "a very superior quality indeed." Its present value is about 2*s.* 11*d.* to 3*s.* per lb.

3. I wrote to Mr. Thomson in the sense of paragraph 5 of my letter of July 8th, 1889. I agreed to pay him 5*l.* for botanical specimens adequate for the determination of the tree and for a supply of seeds for experimental cultivation. This letter apparently never reached Mr. Thomson. From the indications, however, which he has supplied to

us as to the tree which he affirms produces Colombia Virgen, we believe it to be *Sapium biglandulosum*.

As the species of this genus are known to yield a milky juice and it belongs to a family, *Euphorbiaceæ*, which includes the plants yielding Pará and Ceará rubber, the identification is probably accurate. The seeds furnished by Mr. Thomson failed to germinate.

4. I still remain of the opinion expressed in paragraph 2 of my letter of July 8th, that the slender results which have accrued from the large outlay incurred by the Government of India in introducing South American india-rubber plants into that country are not such as to justify any further present expenditure in the matter. As I pointed out in paragraph 4, on high level land Colombia Virgen would have to compete with other cultures likely to yield a quicker return. I do not see that the Government of India need interfere in the matter. If the profits of its cultivation are likely to prove remunerative, in my opinion it may be well left to private enterprise.

5. I propose to embody the information which I have obtained in a note for the *Kew Bulletin*. This will doubtless have the effect of drawing the attention of practical planters to the subject.

I am, &c.

(Signed) W. T. Thiselton Dyer.

J. A. Godley, Esq., C.B.,
India Office.

CLIII.—FIBRE INDUSTRY AT THE BAHAMAS.

(*Agave rigida*, var. *Sisalana*.)

The development of an important fibre industry at the Bahamas has already been the subject of notes in the *Kew Bulletin* (*see* March 1889, p. 57, and October 1889, p. 254).

As indicating the character of the industry from an American point of view the following Report prepared by the United States Consul at Nassau at the beginning of this year will be read with interest. This Report is reproduced exactly as it appears in the "*Reports from the Consuls of the United States*," No. 114, March 1890 :—

Condition of the Sisal Industry in the Bahamas.

Report by Consul McLain, of Nassau.

One year ago I made a report to the Department upon the culture of Sisal hemp in this colony, calling attention to it as a new industry just being introduced, and which promised to bring substantial prosperity to these islands in the near future.

During the year, and especially within the last few months, so many letters have been received at this Consulate from various parts of the United States, making inquiries upon the subject, that I am satisfied a statement touching the present condition of the industry would interest many of our people, and I therefore submit the following :—

The progress made in the development of Sisal culture in the Bahamas during the past twelve months is marvellous. One year ago there was scarcely a dollar of foreign capital, and very little local, invested in this business in the colony, while to day parties from

Great Britain, Canada, and Newfoundland, representing large resources, are interested in Sisal, have bought tens of thousands of acres of Government land, and are industriously engaged in clearing and planting the same to the full measure of their ability to procure the material. A local stock company, styled the Bahama Hemp Company, organised and managed by Nassau capitalists exclusively, has also purchased a large tract of land and is developing the same, whilst thousands of acres are being planted in every direction by individual owners of smaller pieces. American capital up to this date, I regret to say, for it is to its own disadvantage, has been conspicuous by its absence. One company, however, styled the Inagua Hemp Company, organised under the laws of the State of New Jersey, with D. D. Sargent, United States Consular Agent at Inagua, as manager, has lately procured about 1,200 acres at Inagua, and has begun operations.

Messrs. Munro & Co., of St. John's, Newfoundland, have obtained a grant of 18,000 acres of Crown land at Abaco, and are planting the same. Another tract of 20,000 acres has been allotted to a London company on the same island. Mr. Alex. Keith, of Edinburgh, Scotland, has taken 2,000 acres on Andros Island, and is working upon it. But the largest demand has been made lately by two London companies, who are said to be applying for not less than 200,000 acres between them.

Many applications for land have not been reached at all as yet on the files, the Surveyor-General's Department being hard pushed in the matter of surveys and locations, whilst new applications are being constantly received, and have to wait their turn for consideration. So much land has been taken up that the Governor, a short time ago, advanced the price of Crown land from $1·25 per acre, the ordinary price, to $4 per acre, withholding also the benefit of the bounty. And lately it has been decided to sell no more large allotments of Crown land at present, the quantity already allotted with a view to cultivation being as great as the condition of labour in the colony will justify. The number of acres of Crown land already disposed of is about 120,000 acres, whilst pending applications on file, and not yet reached, will amount to at least 200,000 more.

This substantial withdrawal of Crown lands is creating some movement in real estate—as is natural under the circumstances—between private parties, some old properties changing hands at prices double and treble their supposed values two years ago. Persons buying private lands and cultivating them will share in the bounty of 1 per cent. per pound provided by law on all fibre raised and exported. Private lands in New Providence can be bought, unimproved, for from $8 to $12 per acre, and for less on the out-islands.

The employment given to labourers in clearing land and in setting out plants has already put considerable money into circulation, the beneficial effects of which are being felt in various quarters. There has been no special advance in the price of labour, field hands commanding from 40 to 60 cents per day, and finding themselves. Each month, however, witnesses a large increase in the number of those who find remunerative employment, and pleasant relations obtain between employers and employed. The labour question has been and is one that here, as elsewhere, requires delicate treatment; but it has been skilfully met by Sir Ambrose Shea, the Governor, who, long ago perceiving that to permit investors to locate upon adjoining lands would induce sharp competition in wages in thinly settled districts, adopted the plan of scattering the allotments about the different islands, or in localities

remote from each other on the same island, so that each settlement should have its share of the benefits of the new industry, by obtaining, at fair wages, employment for its local labour. In this way, also, a surplus of labour at one point and a scarcity at some other has been avoided. When the entire labouring population becomes employed, as will happen before long at the present rate of development, a new phase of the labour question will arise; but that time is yet in the future, and the remedy can be applied when the situation demands it.

Small shipments of fibre continue to be made by nearly every steamer, a few old plantings furnishing the material. It is not likely that shipments in any quantity will be possible under two years, but after that time an enormous increase may begin to be looked for, increasing steadily as new fields come into bearing, until the annual exports of the colony, which now average about £600,000 will leap well up into the millions, as a moment's reflection will show.

It is a very low estimate to expect half a ton of fibre per acre, and a very low estimate to call it worth $100 per ton, for it is worth over $200 per ton in the world's markets to-day. When even the present quantity of land sold and applied for, to wit, 300,000 acres, is bearing, which ought to happen within five or six years, it will produce 150,000 tons a year, worth $15,000,000, an increase of prosperity that sounds more like a fairy tale than a strong probability deduced from reasonable figures. And yet 300,000 acres is but a small portion of the uncultivated lands within the limits of the Bahamas.

It is estimated that about 6,000 acres of land have already been planted in Sisal (a plantation once started needs no replanting for many years), and that many additional ones have been cleared and made ready for the plants, the obtaining of which has been almost impossible, the industry being seriously retarded thereby. The prices paid for plants have risen from 6 cents per dozen to 36 cents, so great has been the demand; but the price will now decline rapidly, since the supply of plants is developing enormously, about 2,000,000 being now available for planting, and others coming on speedily. The Pita plant is being found on all the islands growing wild, and the stock of old plants is very great. From the centre of the old plant rises a pole about 16 feet in length, on the branches of which small plants grow, averaging a thousand to each pole, and from these poles a vast supply is coming into market, creating a profitable business; for what were two years ago only noxious weeds have all at once become worth £20 apiece for pole plants alone. Quantities of old plants have lately been discovered growing on the cays along the Florida coast, and small schooners are already buying these up and bringing them here for sale. This fact suggests the question whether this new hemp industry, which is about to revolutionise the condition of the Bahamas, may not also be developed in the southern portion of Florida. The plants are found there growing wild just as they are in these islands, and they flourish best in dry sandy soils, fit for little else. I would earnestly call the attention of the Department of Agriculture to this matter, and suggest the propriety of looking into it, and of calling the notice of the people of Florida to this possible source of wealth and prosperity. The conditions of soil, climate, &c., which make its culture a success here may not obtain there, but the simple fact that the plant is found growing wild in Florida is of itself a consideration that should warrant an investigation at the hands of the Department.

The unexampled success of the Sisal industry, in so brief a period, in this colony is entirely attributable to the business-like, systematic

manner in which it has been managed by the present Governor, Sir Ambrose Shea, who has all along taken a most earnest interest in the matter. He is a man of large experience in affairs, and has practical knowledge of the proper way to manage industrial enterprises. From the start he realised that this industry would be the salvation of the Bahamas, and, setting his heart upon it, he pushed it forward with great energy and prudence, overcoming numerous difficulties, surmounting obstacles, encouraging the faint-hearted, until now the people are touched with his own enthusiasm, and the industry is fairly afloat. He visited England, and by personal effort enlisted capitalists and procured large investments. To Sir Ambrose Shea the colonists owe a large debt of gratitude; and when the signal prosperity which is already hanging over the islands shall have been developed to its full measure, they will more perfectly realise how not only their individual interests, but those of outside investors, have been wisely and prudently promoted and guarded from the very inception of the industry by the practical, discreet, and conservative action of their Governor.

There can be no doubt or question as to the success of Sisal culture in this colony. It has passed far beyond the experimental stage, and is giving daily evidence that it will become a source of wealth to all concerned. The combined conditions of soil and climate especially adapted to the growth of first-class fibre give this colony a marked advantage over other West Indian islands, where the plant may grow luxuriantly enough, but will be found deficient in good strong fibre. The poorer and more sterile the soil the better the result, and here the plant flourishes where ordinary vegetation seems almost impossible. It is a plant of unfailing growth, it will live without rain to moisten the soil, you can scarcely exterminate it if you try, it requires but little cultivation, and at an expense below that of almost any other agricultural product, and its value is substantial.

As two-thirds of the trade of the Bahamas is now with the United States; as their only steam communication with the outside world is by a subsidised line of American steamships running between Nassau and New York; as their increased wealth and prosperity means a larger and more profitable commercial intercourse with our own country, we should view this coming development of their material interests with pleasure, and with the warmest wishes for its complete success.

In conclusion, I would add that I have sent by this mail four samples of the Bahama fibre for the information and satisfaction of the State Department, believing that the same would be of sufficient interest to justify me in so doing. These specimens were not specially selected, but are only fair samples of the average fibre which is now being grown and shipped from the colony. Two of them have still attached a stub, or portion of the butt end of the leaf, which was purposely not passed through the machine, showing the character of the Sisal plant when extracted.

THOS. J. MCLAIN, jr.,
Consul.

United States Consulate, Nassau,
January 20th, 1890.

CLIV.—BOTANICAL STATION AT LAGOS.

Particulars respecting the establishment and progress of this, the first Botanical Station on the West Coast of Africa, have already been given in the *Kew Bulletin* (June 1888, p. 149, and March 1889, p. 69). The following letter recently received from the Curator, Mr. McNair, gives interesting information respecting some of the plants under experimental cultivation at Lagos :—

DEAR SIR, Botanic Station, Lagos, 6th May 1890.

I HAVE duly received your letter of the 26th February. With reference to the various plants growing at the Botanic Station, I would mention that the Annatto (*Bixa Orellana*) has established itself with little or no cultivation, and it fruits in abundance. The Teak trees (*Tectona grandis*) planted about two years ago are 20 feet in height, and 9 inches in circumference at 2 feet above the ground. This valuable timber tree is really worth growing extensively in West Africa. The Coca shrub (*Erythroxylon Coca*) grows very freely. It attains the size of a coffee tree and could be cultivated, if necessary, on a large scale. The Honduras Mahogany (*Swietenis Mahagoni*), now nearly two years old, are trees 12 feet high, and 7 inches in circumference at 2 feet from the ground. The Divi-divi plants (*Cæsalpinia coriaria*), sent me from Kew $2\frac{1}{2}$ years ago, are now fine spreading trees. The Liberian Coffee trees in the garden, at two years old, are now in fruit, and in spite of the dry seasons offer great hopes of success. I was much pleased to have seeds of the different sorts of cotton, especially of Egyptian cotton. They are all planted on a small scale. It will be some time before they fruit and yield a sample of cotton. Usually cotton plants do not fruit here until after the heavy rains, which are due about the month of January. I shall let you know later about the progress made by the other plants. Some of the fruit trees at the Botanical Station are doing tolerably well.

From the seed of the Beefwood (*Casuarina stricta*) sent from Kew we have raised a large number of plants, and some of them have been used to form a hedge. All are doing well both here and in the town of Lagos. At the latter place some have been destroyed by crickets eating through the stem. The Chinese Ginger is very flourishing, and it would become established in this part of the world with little cultivation.

The Wardian case of plants received from Kew through the Governor in March last arrived in very fair order. I am sorry to say the Black Pepper (*Piper nigrum*) and the Soap-bark (*Quillaia Saponaria*) both died on the voyage. I am now engaged in preparing a Wardian case of plants to be sent to Kew this month.

I have, &c.

JAMES MCNAIR.

The Assistant Director,
Royal Gardens, Kew.